



## 2.3 Theory of the Firm (Market Structure)

### **2.3.5 OLIGOPOLY**

#### **2.3.5.1 Characteristics of oligopoly**

#### **2.3.5.2 Behaviour of oligopolistic firms: Collusive and non-collusive oligopoly**

#### **2.3.5.3 Equilibrium of the oligopolistic firm**

#### **2.3.5.4 Importance of non-price competition**

#### **2.3.5.5 Evaluation of the oligopoly market structure**

#### **2.3.5.6 Theory of contestable markets**

### 2.3.5.1 CHARACTERISTICS OF OLIGOPOLY

An oligopoly is a market dominated by a few sellers who between them share a large proportion of the market. An oligopolistic market must possess the following characteristics.

#### (i) A few large firms

Oligopoly is "competition among the few". The industry is dominated by a few large firms which control a large proportion of the industry's output. However, a special case of duopoly occurs when there are only 2 firms in the industry. Industries in which oligopolies are common include automobiles, banks, airport ground handling services and ports.

#### (ii) Standardised or differentiated product

Standardized (or homogeneous) products are identical and of the same quality in the eyes of the consumers. The firms in some oligopolistic markets produce standardized or similar products. These include oil and steel.

A differentiated product is one whereby the differences in the product may be real or imaginary but the main thing is that consumers do not regard such products as identical. This could be achieved through physical differences or differences in terms of product image, sales conditions and service levels. Examples of differentiated products include banking products, port services and cars. In general, oligopolists produce similar products when they are used as inputs for other firms. Examples of such products are steel and oil. Most oligopolists, however, produce products which are used by consumers and these tend to be differentiated. Examples include soap, mobile phones and soft drinks.

#### (iii) Substantial barriers to entry

Substantial barriers to entry exist in an oligopoly. Barriers to entry include economies of scale, legal prohibition of new entrants, large capital requirements, patents, copyrights and trademarks, licenses and ownership of essential resources. These barriers to entry are similar to the ones discussed in the lecture notes on monopoly.

The telecommunications sector in Singapore, viz. the mobile phone services industry used to be tightly regulated before liberalisation occurred in the late 1990s. Singtel lost its monopoly status for mobile phone services in 1997 with the entry of M1. To enter the telecommunications industry, firms need to incur a large initial capital outlay to invest in network infrastructure, call center solutions, retail outlets, etc. Thus, the industry for mobile phone services faces substantial barriers to entry. This also applies to other capital intensive industries like port operation business.

#### **(iv) Mutual dependence between firms**

Each firm must take the potential reaction of rivals into account when it makes business decisions. E.g. the pricing decision of PSA often influences the price (and the profits) of rival ports. This mutual dependence is the key difference between an oligopoly and the other market structures.

#### **(v) Price rigidity**

Prices tend to be fairly rigid and do not change much in an oligopoly. Since firms are mutually dependent, each firm will need to consider the responses of rival firms to any price changes made by it. Thus, firms prefer to either engage in common price agreements or are reluctant to change prices at all. Price competition is avoided in an oligopoly.

However, price wars do occur at times. They may arise in situations where a new firm enters and tries to establish its presence by undercutting its rivals.

#### **(vi) Non-price competition**

Firms in an oligopoly engage in non-price competition such as by competitive advertising, promotions e.g. the giving of free gifts, and product development. E.g. the three mobile phone operators in Singapore; Singtel, M1 and Starhub, advertise aggressively and provide attractive gifts and competitive packages to attract customers.

### **2.3.5.2 BEHAVIOUR OF OLIGOPOLISTIC FIRM:**

#### **Collusive and non collusive Oligopoly**

##### **1. How an oligopolistic firm competes**

The mutual interdependence between oligopolists will either lead the firms to

- i) collude to maximize industry profits or
- ii) compete to gain a larger share of industry profits for themselves.

##### **(i) Firms collude**

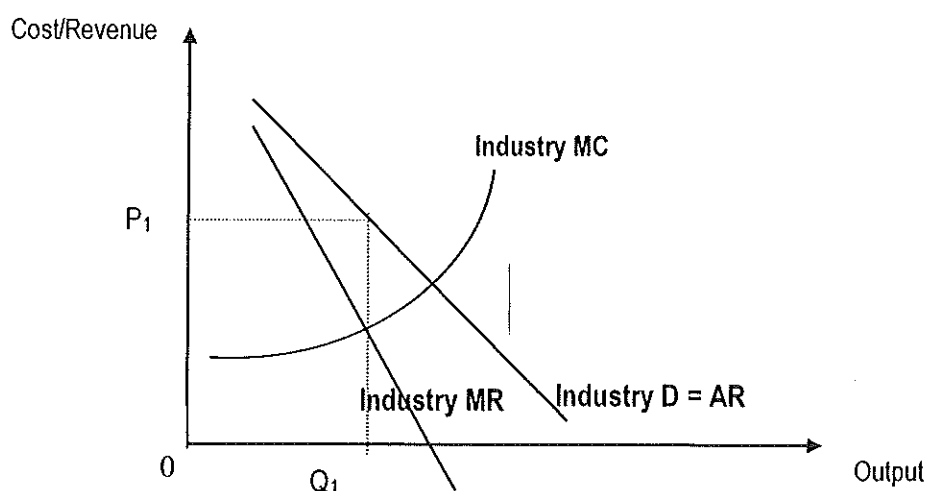
#### **Collusive Oligopoly**

One of the choices which could be adopted by oligopolists is to collude, to maximise industry profits. When firms collude, they agree to restrict competition among themselves and maximize their combined profits. They can decide to set output quotas, fix prices, limit product promotion or development. They could also agree not to 'poach' each other's markets. Examples of collusion include cartels and price leadership.

## Cartels

A cartel is a formal collusive agreement. All firms in a cartel will coordinate their activities so as to maximize industry profits, behaving as if they were a **monopoly**. In other words, cartel members agree to work together and behave like a monopoly. Therefore, the model used to analyse the price and output decisions of a collusive oligopoly is the same as that used to analyse monopoly. This is illustrated in Figure 1.

Figure 1: Profit-maximisation in a Cartel



In Figure 1, profits are maximised at output  $OQ_1$  where  $\text{Industry MR} = \text{Industry MC}$ . The corresponding price is  $OP_1$ .

If the cartel decides to fix prices, it should fix the price at  $OP_1$  so that industry profits are maximised. Alternatively, if the cartel decides to control production through the setting of quotas, each member will be allocated an output quota to supply. The sum of the quotas of all the members in the cartel must add up to  $OQ_1$  so that industry profits are maximised.

The firms in a cartel may decide to either fix prices or set output quotas. A quota set by a cartel is the output that a given member of a cartel is allowed to produce under a production quota or sell under a sales quota. An example of a cartel is OPEC, the Organization for Petroleum Exporting Countries, which was set up in 1960 and currently consists of 11 oil-producing countries. Its objective is to ensure the stability of oil prices by controlling oil supply through the setting of production quotas.

Cartels are illegal in most countries. Moreover, many cartels do not last very long due to disputes among members and the strong incentive to cheat (i.e. cutting prices below the agreed price or exceeding assigned quotas) by individual members.

## Price Leadership

Another example of collusion is price leadership. Firms in the oligopoly will follow the pricing decisions of a firm chosen to be the price leader. The price leader can be the largest firm dominating the industry. This is known as *dominant price leadership*.

Alternatively, the price leader can also be the firm whose prices are believed to reflect market conditions in the most satisfactory way. This is known as *barometric price leadership*. The price leader will seek to set a price which will maximise its own profits. The leader will initiate price changes which will then be followed by all the other firms in the oligopoly.

### **Factors favouring collusion**

It will be easier for firms to collude if

- there are few firms in the industry;
- the market is stable;
- an identical product is produced;
- firms have similar production methods and average costs;
- there are effective monitoring systems to identify any cheating.

### **ii) Firms do not collude**

#### **Competitive oligopoly**

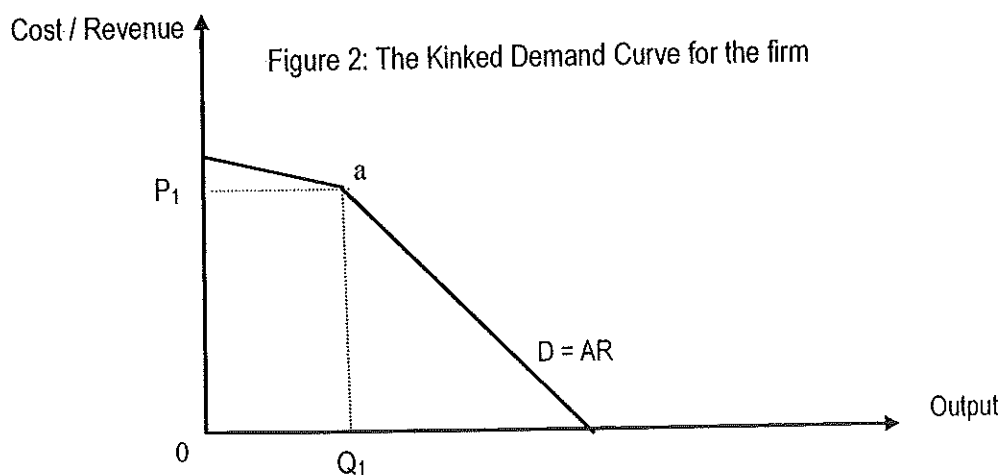
When firms do not collude, they compete to gain a larger share of industry profits for themselves. The most famous of all theories of oligopoly is the kinked demand theory discussed below, which can be used to discuss the behaviour of oligopolists when they do not collude.

#### Kinked demand model of oligopoly

The kinked demand curve model was developed in 1939 by Paul Sweezy. The model is used to explain **price rigidity** in oligopolistic markets.

2 key assumptions are made in the kinked demand model:

- a) If an oligopolist lowers its price, its rivals will also follow and lower their prices so as not to lose customers to the first firm which lowered prices.
- b) If an oligopolist raises its price, its rivals will not follow because by not raising prices, they can gain customers from the firm which raised prices.



Interpreting the kinked demand curve:

- Firms are reluctant to change equilibrium price.

Each oligopolist faces a demand curve which is kinked at current price ( $OP_1$ ) and output ( $OQ_1$ ). Once the equilibrium price is established, firms are reluctant to change price. This is illustrated in figure 2 where the current price is  $OP_1$  and the firm is producing  $OQ_1$ .

If price is increased (above  $OP_1$ ):

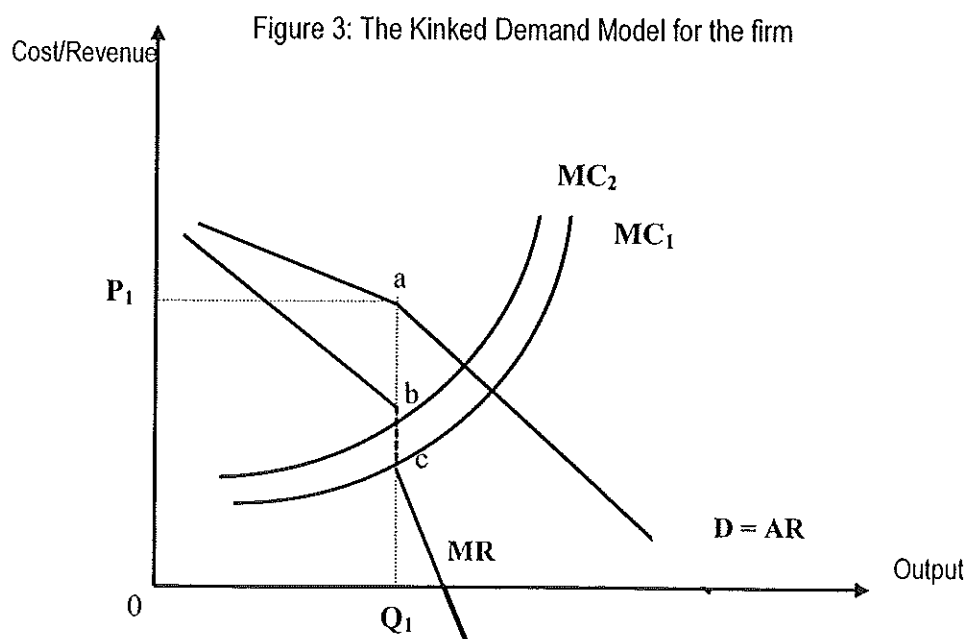
The oligopolist faces a relatively elastic demand curve if price is increased above  $OP_1$  and he is reluctant to increase its price. This is because he expects that rival firms will not follow any price increases (from the assumptions). The firm will suffer a substantial decline in sales if it raises its price because customers will switch to the now-relatively cheaper rivals.

If price is reduced (below  $OP_1$ ):

Demand is relatively inelastic if prices are reduced below  $OP_1$  and the oligopolist is reluctant to reduce its price. This is because he expects that rival firms will match any price decreases (from the assumptions) and he would not be able to lure many customers away from its rivals. Any increase in sales will be modest. Each firm retains its market share, but all gain lower profits than before due to the lower prices.

It can thus be concluded that an oligopolist will be reluctant to change prices. Due to the interdependence of firms, price rigidity is a common characteristic of oligopolistic markets.

- There is a range of changes in cost over which the firm will not change its price and output



#### Explaining price rigidity using the kinked demand model:

Just like firms in any other market structure, the oligopolist produces at quantity where  $MR=MC$  to maximise profits. But, the MR curve corresponding to the kinked demand curve is discontinuous at output  $OQ_1$  and this discontinuity is represented by the vertical gap 'bc' in Figure 3. This means that an oligopoly will not change its equilibrium position if costs vary between  $MC_1$  and  $MC_2$ . Thus, if the initial marginal cost curve is assumed to be at  $MC_1$ , then a rise in costs to  $MC_2$  would result in no change in price and output i.e. prices remain rigid.

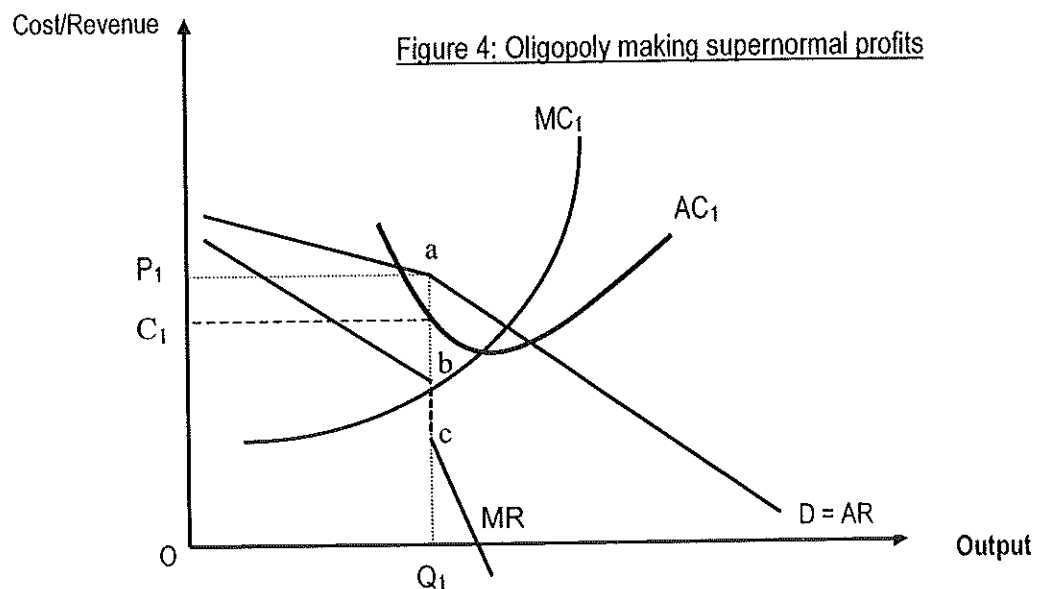
#### Limitations:

Price rigidity may also be due to other factors, besides the explanation provided by the model. The kinked demand curve helps to explain why oligopoly prices are stable even without collusion among firms. But, it does not explain how the existing price  $OP_1$  is arrived at. Moreover, price increases in the oligopoly market during the inflationary periods of 1970s and early 1980s were seen in the advanced economies. Similarly, the retail petrol stations have been hiking pump prices in response to escalating oil prices.

### 2.3.5.3 EQUILIBRIUM OF THE OLIGOPOLISTIC FIRM

The oligopolist can make supernormal, normal or subnormal profits in the **short run**.

The oligopolist can enjoy supernormal profit even in the **long run** because of significant barriers to entry. In the long run, an oligopolist will remain in business only if he can at least make normal profit. Figure 4 shows an oligopoly in long run equilibrium and making long run supernormal profit of  $P_1abe$ .



#### **2.3.5.4 IMPORTANCE OF NON-PRICE COMPETITION**

- I. By their very nature, oligopolistic firms do not usually exhibit active price competition. The benefits from cutting prices tend to be small given the reactions of rivals. Hence, a so-called price war is unlikely to persist.
- II. Therefore, competition for an increased percentage of total sales in the market must take some other form. The alternative form is what is generally called non-price competition. Non-price competition is an attempt by one oligopolistic firm to attract customers by some means other than a price differential. Advertising, quality variations and branding, free gifts, quality of service and changes in packaging are just a few examples. Loyalty programmes are gaining popularity with consumers too.

#### **2.3.5.5 EVALUATION OF THE OLIGOPOLY MARKET STRUCTURE**

##### **EVALUATION OF AN OLIGOPOLY MARKET STRUCTURE**

##### **DEMERITS:**

The demerits of oligopolies are most severe when entry barriers exist and firms collude as in a cartel or price leadership. When firms in an oligopoly collude, they behave like a monopoly. Thus, some of the demerits of an oligopoly are similar to that of a monopoly. In addition, oligopolies may be viewed as more undesirable than a monopoly since oligopolists have less scope to reap economies of scale and are likely to engage in competitive advertising.

##### **1. Productively and allocative Inefficiency**

Oligopolies are productively inefficient, because the equilibrium output occurs on the falling portion of LRAC

Oligopolies are also allocatively inefficient. Each oligopolist produces output up to a level where  $P > MC$ . Consumers value the last unit of the good more than it costs to produce that unit. The good is underproduced and welfare loss is incurred. Resources are thus not allocated efficiently to produce the right quantities that consumers want.

##### **2. Lower output and higher price**

An oligopolist will charge higher prices and produces at a lower output level compared to a perfectly competitive industry.



### **3. Unequal income distribution**

In an oligopoly, it is possible for firms to earn supernormal profits even in the long run, due to the existence of barriers to entry. These profits will go to the shareholders, who may consist of mainly the higher-income earners, thus worsening the income distribution.

### **4. Competitive advertising--a waste of resources**

Oligopolists are likely to engage in more competitive advertising than a monopoly in their bid to increase their individual market shares. Advertising may be seen as a waste of resources since it does little to change the actual quality of the product. Moreover, advertising leads to higher costs and may raise the price paid by the consumer, thus making it undesirable.

### **MERITS:**

Oligopolies also have their merits.

#### **1. Dynamic Efficiency**

It is possible for oligopolists to earn supernormal profits in the long run. Oligopolists have an incentive to use some of the supernormal profits earned to invest in research and development, since an improved product will help to increase market share and profits. There is thus dynamic efficiency.

#### **2. Greater consumer choice**

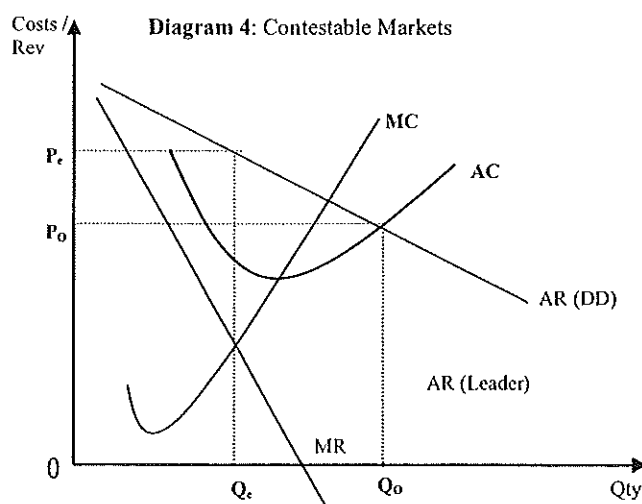
Oligopolists tend to engage in non-price competition. Non-price competition through product development produces variety and leads to innovation in response to the wide array of consumer tastes and preferences. This results in greater consumer choice.

#### **3. Economies of scale**

There is scope for reaping economies of scale compared to perfect competition/monopolistic competition. Since, the market is shared between a few dominant firms, they can gain from the cost advantages of large scale production.

### 2.3.5.6 THEORY OF CONTESTABLE MARKETS

- I. A monopoly or firms in an oligopoly may not attempt to maximise profits. Instead, a firm making supernormal profits may be fearful of new entrants to the market. Indeed, a hit-and-run competitor will notice when super-normal profit is being made, enter the market and take advantage of the situation and then leave the market upon reaching less than normal profits. However, for hit-and-run competition to be a threat, not only must the costs of entry to the market be low, the costs of exit need to be low too.
- II. Thus, a contestable market requires barriers to entry and exit to be low, and a perfectly contestable market requires a total absence of barriers to entry and exit.
- III. The costs of exit are sometimes called 'sunk costs'. These are costs that cannot be recovered when the firm leaves the market. For example a high street shop can be sold easily to another retailer. However, some things might not be sold off, for example shop signs. The sunk costs for contestable markets must not be too high.
- IV. Firms which are fearful of new entrants in the market may not aim to increase the barriers to entry. As such, the existing firm(s) may forgo their supernormal profits and instead provide the services at the lowest possible price (normal profits) to discourage new entrants. Instead of charging price  $P_e$  under the assumption of profit maximisation, firms may charge as low as  $P_0$  to reduce the risk of new firms entering the industry while maintaining at least normal profits.

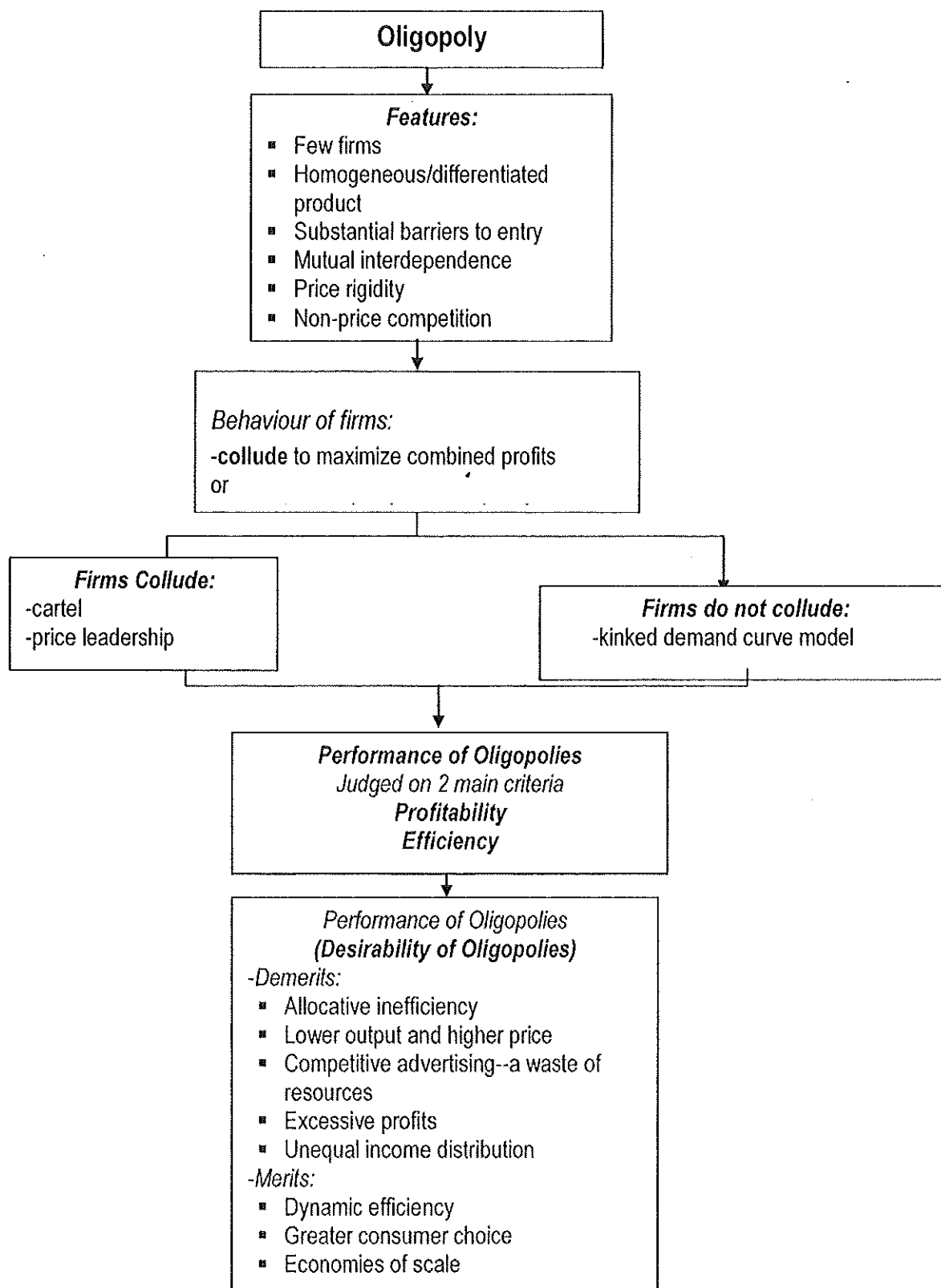


- V. Moreover, some businesses will try to increase the sunk costs to deter hit-and-run competitors. Creating a brand name or corporate image can be hugely expensive. Advertising costs are often a significant part of a company's total costs for products such as cigarettes, perfume, soap powder. Leaving the market means that all the money spent creating the brand would be lost. The costs of high-tech (electronics) goods involve very high fixed costs in terms of machinery, design, staff training, advertising etc. so that sunk costs are high and this will discourage

companies from entering the market unless they are planning to stay for the longer term.

- VI. The theory of contestable markets has been used as a defence for monopolies such as Microsoft. The company has argued that they have a monopoly on operating systems but because the costs of entry are so low that the software business is contestable. Yet, the sunk costs are definitely very high.

## AN OVERVIEW



## APPENDIX 1

### CONCENTRATION RATIO

We can get some indication of how competitive a market is by observing the number of firms: the more the firms, the more competitive the market would seem to be. However this does not tell us anything about how concentrated the market might be. There may be many firms but the largest two firms might produce 95 per cent of total output. This would make these two firms more like oligopolists. Another approach to measure the degree of competition is to focus on the level of concentration of firms.

The simplest measure of industrial concentration involves adding together the market share of the largest so many firms: e.g. the largest three or the largest five. This is known as the '3-firm or 5 firm concentration ratio.'

## APPENDIX 2

### Port of Singapore Authority (PSA)

The port industry is an example of an oligopolistic market. Although there are many port operators in the world, the four dominant ones are Hutchison Port Holdings (HPH), PSA International, AP Moller (APM) and P&O Ports. Of these, PSA operates the world's largest container hub in Singapore.

#### **1. World's Largest Transshipment Hub**

PSA is headquartered in Singapore where its flagship Singapore Terminals operates the world's largest container transshipment hub. In 2003, PSA handled 28.7 m TEUs of containers at all its ports around the world, including 18.1 million TEUs in Singapore. It has been estimated that about one in five of the world's transshipment boxes go through PSA.

#### **2. PSA offers high value-added trans-shipment services**

PSA has worked hard to build up a global brand name that is well known for its efficiency, speed and reliability in the global transshipment business. PSA has succeeded in specialising in a unique niche of the port business and has made Singapore the world's transshipment hub. Transshipment is a more complex process than direct point-to-point shipping through local cargo ports like Hong Kong. Yet, PSA is able to deliver efficient, cost-effective and reliable transshipment services to the shipping lines. This is reflected in the numerous awards and accolades won over the years including winning the "Best Container Terminal Operator (Asia)" award for the 15<sup>th</sup> consecutive year in 2004.

#### **3. PSA enjoys significant barriers to entry**

PSA's extensive connectivity and huge scale of operation pose formidable barriers to entry for new entrants. PSA Singapore offers its customers, the shipping lines an excellent choice of 200 shipping lines with connections to 600 ports in 123 countries. Such extensive connectivity implies daily sailing to every major port in the world which means

that shippers can enjoy shorter transit time. This extensive connectivity is not easily replicated by its rivals. PSA also has high start up cost. To illustrate, one super post-panamax quay crane costs about S\$10m each in 2004. PSA Singapore has a total of 37 berths, 118 quay cranes, and 375 yard cranes in 2002.

#### **4. PSA responded to competitive threats with deep price cuts**

After PSA lost two of its customers, viz., Maersk Sealand and Evergreen Marine, to Malaysia's Port of Tanjung Pelapas during 2000-2001, PSA retaliated in July 2002 with a 10% across-the-board discount on all bills at PSA cargo terminals and a 50% discount on empty containers, all of which are effective for a year. This proved to be effective as many of the major shipping lines gave PSA additional commitments and there have been no further losses of clients to its Malaysian rival to-date.

But, prior to 2000, there was a long period of price stability for PSA. But, when the price war broke out between PSA and PTP, it is likely to be a strategic attempt to reduce PTP's competitiveness and profitability. Moreover, PSA itself went through cost rationalization and restructuring in order to significantly lower cost. As such, the kinked demand curve model is a useful model (though not perfect) for explaining PSA's price and output behaviour.

#### **5. PSA engages in non-price competition to strengthen position**

PSA uses a wide range of non-price competitive measures to strengthen market leadership position. These include marketing efforts to strengthen Singapore's connectivity to other ports, clinching long term service agreements and entering into joint venture deals with clients such as the landmark deal with Cosco to operate two dedicated berths at PSA Singapore's Pasir Panjang terminal by 2008. Fundamental to PSA's high operational efficiency is its constant deployment of advanced technological applications and innovations to meet customers' needs and operational challenges.

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### APPENDIX 3

#### A COMPARISON OF THE FOUR MARKET STRUCTURES

	Market Structure	Perfect Competition	Monopolistic Competition	Oligopoly	Monopoly
Features	Characteristics				
	Number and size of firms	Many small firms (No market power)	Many small firms (Limited market power)	Few large firms (Significant market power)	Single firm (Formidable market power)
	Nature of the Product	Homogeneous product	Differentiated product	Homogeneous or differentiated product	Unique product (No close substitutes)
	Ease of entry	Free entry and exit	Free entry and exit	Substantial barriers to entry	Formidable barriers to entry
Firm's demand curve	Firm's Demand Curve	Perfectly elastic (horizontal)	Fairly elastic (downward-sloping)	Collude: Inelastic downward-sloping demand Do not collude: kinked demand	Inelastic (downward-sloping)
Performance	Profits in short run	Supernormal/normal/ subnormal profits	Supernormal/normal/ subnormal profits	Supernormal/normal/ subnormal profits	Supernormal/normal/ subnormal profits
	Profits in long run	Normal Profits	Normal Profits	Normal/supernormal Profits	Normal/supernormal profits
	Productive Efficiency	Yes	No	No	No
	Allocative Efficiency	Yes	No	No	No

## Degree of Competitiveness in each market

